



Climate Dynamics Webinar, George Mason University

Significant Improvement of Dynamical ENSO Forecast with an Artificial Neural Network

September 30, 2020 NOAA Climate Prediction Center scientist Dr. Peitao Peng was invited to give a seminar at the Department of Atmospheric, Oceanic and Earth Sciences, George Mason University (AOES/GMU) on the recent advancement of an artificial neural network (ANN) application to improve ENSO forecasts with co-authors Wanqiu Wang and Yun Fan. His analyses showed that dynamical ENSO forecasts with North American Multi-Model Ensemble (NMME) were of great skill, but false alarms existed in the forecasts initialized in spring and early summer for some years (*i.e.* DJF of 2002, 2013, and 2018).

Using ANN, which is capable of handling nonlinearity problems and avoiding collinearity among predictors with no need for prior assumptions about the data distribution, and suitability for big dataset, Dr. Peng demonstrated ANN is not only effective in correcting false alarms, leading to improved overall forecast skill (Fig.1), but ANN is also reliable, by which the parameters obtained are not sensitive to little changes in the training data. To understand what contributed to the forecast improvements, Dr. Peng further revealed that local SST alone is not enough for an optimal correction. The critical information to the correction by ANN is primarily from the model forecasts in the northwestern tropical Pacific region, where forecasted sea surface temperatures are well correlated with the observed Niño 3.4 SST index. In conclusion, he recommended that correctly representing this relationship should be a focus for improving dynamical ENSO forecast.

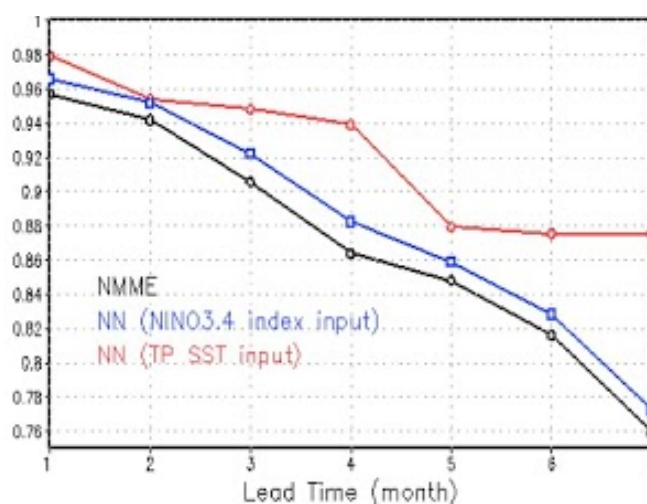


Fig. 1 Anomaly correlation of Niño 3.4 index forecast with Optimum Interpolation Sea Surface Temperature (OI SST) at 1-7 month lead for DJF of 1983-2020. (black line: the forecast made by NMME, blue line: forecast correction done by ANN with input of Niño 3.4 index, vs. redline: forecast correction done by ANN with input of Tropical Pacific (120°E-290°E, 20°S-20°N) SST).

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**Climate Prediction Center
Stakeholder Meeting**
24-26 September 2019



National Weather Service
National Oceanic and Atmospheric Administration
Department of Commerce

Announcement

On the anniversary of the 2019 CPC Stakeholder Meeting, the Meeting Extended Summary Collection Volume entitled “Performance Evaluations, Improvement Requirements, and Development Updates” is approved for release. It has been archived by NOAA Institutional Repository with Section 508 accessibility compliance, and can be accessed via Digital Object Identifier (DOI) system at <https://doi.org/10.25923/rcqj-t803>, which is minted inside the front cover.

This volume is a collection of extended summaries of the presentations contributed by the meeting participants. The information is used to improve the delivery and usability of the existing products (*e.g.*, additional parameters, format change *etc.*) and inform development of new products and improvements to existing products.

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